IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPELAS AND INTERFERENCES

Applicant:	Daniel Alroy
Serial No:	09/871,560
Filed:	May 31, 2001
For:	Concepts and methods for identifying brain correlates of elementary mental states
Examiner:	Jerry Lin
Art Unit:	1631

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

May It Please The Honorable Board:

Appellant appeals the Final Rejection dated January 17, 2007 of Claim 6 of the above-identified application. The fee of two hundred and fifty dollars ($250.00) for filing this Brief accompanies this Brief. Enclosed is a single copy of this Brief.

Appellant does not request an oral hearing.

I. REAL PARTY IN INTEREST

The real party in interest of Application Serial No. 09/871,560 is:

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II. RELATED APPEALS AND INTERFERENCES

There are currently, and have been, no related Appeals or Interferences regarding Application Serial No. 09/871,560.

III. STATUS OF THE CLAIMS

Claim is rejected and the rejection of claim 6 is appealed.

IV. STATUS OF AMENDMENTS

No amendments were made after Final Rejection and all previous amendments were entered and are reflected in the claims included in Appendix I.

V. SUMMARY OF CLAIMED SUBJECT MATTER

1. The subject matter of claim 6.

Each of the three elements of claim 6 is stated in a paragraph form, followed by references, within square brackets, to the related Specification.

1.0 Preamble. A method for identifying brain loci of neural correlates of a particular elementary mental state, such as any innate submodality element of sensation [§C2.1-2.2, page 14, lines 13-23; §D3-4, page 16, lines 19-25 and page 17, lines 1-6].

Preamble-related specification. The present Specification is based on the fact that submodality elements of sensation are innate and are evoked in the brain: "Sweetness, for example, is not a property of sugar, nor does sweet taste originate in taste receptors. Instead, that sensation is innate, and is evoked in the brain. The same applies to the middle C pitch, the color red, or the sensation of pain" [§C2.1, page 14, lines 13-18]. The Specification shifts the locus of sensation from sensory receptors in the PNS to cortical columns located within submodality-specific cortical areas. Claim 6 provides methods for the identification and validation of said brain loci

1.1 *Claim element 6(1): Correlating stimulus, sensation and behavioral response*

Establish a correspondence between any submodality element of sensation first with the external stimulus that normally elicits it, and then with a voluntary behavioral response, so that said behavioral response following said stimulus signifies the presence of the said element of sensation, and the absence of said behavioral response signifies the absence of said element of sensation.

[§D1.1-1.2, page 15, lines 19-26;
§F1 - F2.2, page 20 lines 20-26 and page 21, lines 3-15;
§O1.2-1.3, page 34 lines 9-17;
§P3-5, page 38, lines 1-28 and page 39, line 1;
§R2.1, page 42, lines 1-19].

Related Specification. The present Specification applies to subjective states that do not contain smaller constituents, termed elementary mental states, as exemplified by sweet taste, red color and the middle C pitch [§C2.2, page 14, lines 14-23], rather than perception of the level of sensory modalities [§D4, page 17, lines 7-16]. Elementary mental states are innate, evoked in the brain, and other than intensity and duration, have no internal constituents [§D1.1 page 15, lines 19-22]. The Specification is explained by reference to the sensory modalities of vision, hearing, touch, taste and smell. A sensory modality represents a three-level hierarchy. The sensory modality of vision, for example, contains the submodality of color, which in turn contains submodality elements such as red, green, yellow and blue. Submodality elements do not contain any smaller constituents [§D3 page 16 lines 19-25 and page 17, lines 1-6]. Behavioral responses are publicly observable while subjective states are not. Subjective states are made indirectly observable by first correlating them with behavioral responses. Psychophysics provides methods to correlate the externally observable behavioral response with simple subjective sensations [§F1-2, page 20, lines 7-26 and page 21 lines 1-15].

1.2 *Claim element 6(2): Identifying activated brain loci in response to stimulus*

Following said external stimulus and said corresponding behavioral response, detect brain loci that manifest transient increased activation

[§C2.1-2.2, page 14, lines 13-23;
§ D1.1-1.2, page 15, lines 19-26;
§D5.1- 5.3, page 17, lines 17-29 and page 18, lines 1-22;
§E, page 19, lines 1-29 and page 20 lines 1-6;
§F1-F2.2, page 29, lines 7-26 and page 30 lines, 1-15;
§O1.2, page 34, lines 9-11;
§P3, page 38, lines 1-11;
§P4.2, page 38, lines 17-24;

Related Specification. In primates, the three-level hierarchy of modalities, submodalities and submodality elements is spatially represented in the cerebral cortex [§D2, page 16, lines 5-18]. Modality-specific areas contain submodality-specific areas, which in turn contain cortical columns representing submodality-specific elements. Submodality-specific areas receive input from within their modality-specific cortical areas and are thus located within secondary, or non-primary, modality-specific cortical areas [§E1-2, page 19, lines 1-20]. The column is a unit of elementary function in the cerebral cortex. The column also has been identified as a unit of subjective sensation in several submodality-specific cortical areas [§E3, page 19, lines 21-29 and page 20 lines 1-2]. The direct electrical (or other) of any column in BA1 in an awake, normal person, elicits the sensation of light touch in the corresponding part of the body surface [§F3.1, page 21, lines 16-25]. The direct stimulus does not contribute to the qualitative nature of the response--the evoked neural function is an intrinsic property of the stimulated loci [§D5.2, page 18, lines 3-12]. Submodality elements of sensation are innate: Sweetness, for example, is not a property of sugar, nor does sweet taste originate in taste receptors. Instead, that sensation is innate and is evoked in the brain. The same applies to the middle C pitch, the color red or the sensation of pain [§C2.1, page 14, lines 13-18]. Consider sound. The direct stimulation of the auditory cortex of the born deaf evokes sensations of sound. This fact proves that the sensation of sound is neither a property of air vibration nor a sensation originating in the ears. It is this fact that underlies the successful use of cochlear implants for the born deaf [§D5.3-D5.4, page 18, lines 13-26]. In response to external stimuli, some brain loci would be preferentially activated in addition to the subjective state and the behavioral response. Such activation involves increased metabolism of glucose and oxygen, and increased evoked potential activity. Consider the sensation of light touch. An external stimulus of light touch on any part of the surface of the body produces preferential activation of columns in BA1 (Brodmann area 1) [§F3.1, page 21, lines 16-25].

1.3 *Claim element (3): Validation through selective deactivation*

Among said brain loci that manifested increased activation in response to said stimulus, identify those whose inactivation selectively eliminates said behavioral response to said external stimulus without eliminating behavioral responses to external stimuli that induce other elements of sensation within the same submodality.

§P5, page 38, lines 25-28 and page 39, lines 1-12;
§C4, page 15, lines 7-12;
§F6, page 23, lines 15-25;
§O1.3 page 34, lines 12-17;
§R2 page 42, lines 1-18]

Related Specification. Brain loci that were identified following their increased activation in response to stimuli are then deactivated [§P5.2, page 39, lines 2-6]. A brain locus proves to be specific to a given submodality element if its deactivation selectively eliminates the otherwise normal response to the external stimulus. Selectivity here means that said deactivation does not eliminate responses to stimuli for other elements within the same submodality [§P5.3, page 39, lines 7-12].

The terms inactivation and deactivation are used interchangeably [§F4.2, page 23, lines 1-2].

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claim 6 is rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement and under the requirement for enablement. Claim 6 is also rejected under 35 U.S.C. §102(b) as being anticipated by Trivedi et al. (U.S. Patent No. 4,862,359).

VII. ARGUMENTS

Applicant respectfully submits that claim 6 is fully enabled and supported in the specification of the present invention. Additionally, Applicant respectfully submits that Trivedi does not anticipate the present claimed invention. Thus, reversal of the Final Rejection (hereinafter termed "rejection") of claim 6 under 35 U.S.C. §112, first paragraph and 35 U.S.C. §103(a) is respectfully requested.

2. Introduction

2.0 The invention. Applicant respectfully submits that the invention is relevant to the appealed claim.

2.1 The field of invention. The invention is based on the fact that sensations are evoked in the brain rather than received from the senses and that intrinsic neural function is intracellular rather than intercellular. There was no appropriate patent classification for the subject patent application when it was filed. That situation, which apparently remains true to this day, contributed to what is shown below to be an erroneous determination.

2.2 Initial classification. On filing the patent application, Applicant suggested (Exhibit 1, Appendix II) that there is a need for patent classification appropriate for the new field. The response (Exhibit 2, Appendix II) did not share that view. Initially, the patent application was misclassified and assigned Class 706 ("Artificial Intelligence"). Like structural and molecular biology, the invention is based on tight coupling of structure and function. Artificial Intelligence represents the diametrically opposite view, postulating that neural function is independent of neuroanatomy. That anomalous classification decision signaled that the examination of the present patent application would not be a straightforward matter.

2.3 Restriction of claims. The absence of an appropriate classification led to the restriction of claims. In response, the instant claimed matter excludes reference to subcellular level and is confined to methods of identifying brain loci of neural clusters of interest. Said restriction of claims made possible the comparison of the invention with a patent (Trivedi et al.) to which it is utterly unrelated.

2.4 The present patent application. Applicant concedes that the present patent application was not professionally done. The sequence of presentation of the subject matter, for example, was non-compliant. It was corrected, as required, following the first Office Action. Similarly, the initially submitted informal drawings were non-compliant. However, the Notice of Draftsperson's Patent Drawing Review was not received, indicating that the patent application was not processed by the Drawing Review Branch, as required by 37 CFR §1.85(a), thus affecting the description and enablement aspects of the Specification. Nevertheless, Applicant submits that the arguments below show that the description and enablement requirements are satisfied, and that the Trivedi et al patent does not anticipate the present Specification and claim 6.

3. **Rejection of Claim 6 under 35 U.S.C. §112, first paragraph**

Reversal of the rejection of claim 6 under 35 U.S.C. §112, first paragraph is respectfully requested because the rejection makes the following crucial errors. The Rejection erroneously states that present invention as claimed in claim 6 does not comply with the written description requirement.

Applicant's Response:

3.1 The Summary of Claimed Subject Matter, in Section V above, shows the present Specification to be simple, general and precise. The Conceptual Framework portion of the Specification *pre-identifies* brain areas containing the loci of interest. Claim 6 then provides a three-stage method for the actual identification of brain loci of interest within the pre-identified brain areas:

3.1.1 Correlate sensation, external stimulus, and behavioral response

3.1.2 Present external stimulus and identify activated brain loci

3.1.3 Deactivate identified loci and determine if response elimination is selective

Applicant submits that the discussion below of the enablement requirement and the Trivedi et al. patent further show that the present Specification meets the description requirement.

3.2 *Regarding New Matter Rejection.* The discussion below of the enablement requirement and the Trivedi patent indicates that the Examiner misconstrued the present Specification in several crucial respects. Such misconstruction severed the connection between the Specification and the claim, contributing to an appearance that the claim is new matter. In addition, Applicant now understands that alternative wording, or lack of strict synonymy, can be grounds for new matter rejection. Such formulation flaws can generally be amended. Applicant would have amended the non-compliant language of the claim had the Examiner pointed out the non-compliant claim elements.

3.3 Under MPEP 707.07(j), Applicant asked that the Examiner formulate a claim. The Examiner concedes that the specification describes methods of identifying brain loci of interest in mice, stating: "Furthermore, although the instant specification describes methods to detect brain loci that manifest increased activation as well as identifying brain loci whose deactivation selectively eliminates a behavioral response in mice, the specification does not teach any other methods of identifying brain loci whose deactivation selectively eliminates behavioral response. ... " (point 6, page 4). Applicant submits that it is shown below that Trivedi et al. do not anticipate the invention or the instant claim 6, thereby removing this factor as a possible reason why the Examiner would not formulate a claim, thus obviating the ground for New Matter Rejection.

4. <u>Rejection of Claim 6 under 35 U.S.C. §112, first paragraph</u>

Reversal of the rejection of claim 6 under 35 USC §112, first paragraph is respectfully requested because the Rejection makes the following crucial errors. The Rejection erroneously stating that present invention, as claimed in claim 6, does not comply with the enablement requirement.

The Examiner faults the first and third claim elements in regards to the enablement requirement. They are considered in turn.

4.1 *Claim element 6(1)*

The Examiner states: "The instant specification does not teach one of ordinary skill the art of how to establish correspondence between the submodality element of sensation and the external stimulus that normally elicits and a voluntary behavioral response" (point 6, page 4).

Applicant's Response:

The difference between the first and the second claim elements clarifies the issue. The first claim element involves psychophysics. It does not require, and typically does not involve, reference to the brain. The second claim element does involve brain response. Psychophysics is a hundred-year-old discipline. Its techniques are well known to those skilled in the art and do not need to be taught. In many cases in fact, descriptions of neuropsychological tests omit the psychophysics stage and proceed directly to the stage that involves brain response. The Trivedi patent (discussed below), is an example of that practice. The first claim element makes explicit that publicly observable behavioral responses can be correlated with sensations, which are not publicly observable.

In conclusion, the first claim element is in compliance with the enablement requirement.

4.2 *Claim element 6(3)*

The Examiner then states: "Furthermore, although the instant specification describes methods to detect brain loci that manifest increased activation as well as identifying brain loci whose deactivation selectively eliminates a behavioral response in mice, the specification does not teach any other methods of identifying brain loci whose deactivation selectively eliminates behavioral response. Given that the brain is a complex organ where different species may have different types of responses or different functions the actual steps required to apply the instantly claimed method is unpredictable. Thus, one of ordinary skill in the art would have to perform undue experimentation in order to find a method of identifying brain loci whose deactivation selectively eliminates behavioral response without additional guidance or positive steps from the specification" (point 6, page 4).

Applicant's Response:

4.2.1 The Specification relates primates and humans rather than to mice. This is the consequence of 1) exemplifying elementary mental states by submodality elements of exteroreceptor-based sensation and 2) the spatial representation of said submodality elements in the cerebral cortex of primates: "In primates, the last stages of processing exteroreceptor information involving vision, hearing touch, taste, and smell, take place in modality-specific areas of the cerebral cortex" [§D2, page 16, lines 5-18]. The primary focus on human is further illustrated in the description of brain stimulation of the sensory cortex [§D5.3-5.4, page 18, lines 13-26]. Similarly, the Specification explicitly refers to humans in characterizing the cortical column as an elementary unit of neural function and as correlate of a submodality element of sensation: "Columns in submodality-specific cortical areas. The column is a unit of elementary function in the cerebral cortex. The column also has been identified as a unit of subjective sensation in several submodality-specific cortical areas. ... In the somatosensory cortex, the direct electrical stimulation of BA1 in normal awake human subjects produce the sensation of light touch in the corresponding part of the body surface ..." [§E3, page 19, lines 21-29 and page 20, lines 1-2].

4.2.2 Selective deactivation in non-human primates is addressed in [§P5.2, page 39, lines 2-6].

4.2.3 The differences between mice and humans are specifically addressed [§P1.1, page 36, lines 26-27 and page 37, lines 1-6].

4.2.4 In describing experiments with mice, an explicit reference is made to the identification of their human homologs [§O4, page 35, lines 18-22]. GenBank and other public domain databases contain the nucleotide sequences of the human and mouse genomes. Persons with ordinary skill in the art know how use software tools, such as BLAST, to identify human homologs of the mouse mRNA/ cDNA in said databases.

4.2.5 On a more fundamental level, the invention makes use of discoveries which demonstrate that some of the same mechanisms underlie evolution and development, and that these mechanisms are ultra-conserved. In particular, the nervous systems manifest deep homology in the sense that the same intercellular pathways are associated with the same intracellular pathways throughout the tree of life. Such consideration is a basis for identifying subjective states in non-human species [§S4, page 45, lines 6-12].

In conclusion, the specification enables persons skilled in the art to successfully carry out the third claim element.

In view of the above remarks, Applicant respectfully submits that claim 6 is fully enabled by the present specification and respectfully requests that the rejection under 35 USC 112 be withdrawn.

5. Overview of the Cited References

Topographical mapping of brain functionality from neuropsychological test results. Trivedi et al. Patent Number 4,862,359, issued August 29, 1989

5.1 *Applicant's description of the subject matter of the Trivedi patent.* The Trivedi patent provides non-invasive methods of measuring brain responses to stimuli and displaying the result as topographical maps. Brain responses, such as evoked potentials, are measured by the use of electroencephalograph (EEG), while regional cerebral blood flow is measured by use of positron emission tomography (PET). The brain areas of interest are large: Figure 8 of the patent shows twelve regions of interest plus the cerebellum. The psychological functions that are the subject of the Trivedi patent are typically complex and include, for example, language. The relation between subjective states and brain regions is that of statistical correlations.

5.2 Applicant's Response:

Below are some fundamental differences between Claim 6 and the Trivedi patent.

	Feature	**Claim 6**	**Trivedi**
5.2.1	Subjective states that do not contain smaller constituents	Yes	No
5.2.2	Brain loci specificity as compared to brain regions	Yes	No
5.2.3	Validation by use of selective deactivation	Yes	No

5.3 **Rejection of Claim 6 under 35 U.S.C. §102(b) as being anticipated by Trivedi**

Reversal of the rejection of claim 6 under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 4,862,359 issued to Trivedi et al. is respectfully requested because the rejection makes crucial errors in interpreting the cited references. The rejection incorrectly states that claim is anticipated by Trivedi.

The Examiner attributes the three elements of Claim 6 to Trivedi et al, stating: "Trivedi et al. teach a method that includes establishing a correspondence between sensation and stimulus and behavioral response (columns 13, lines 15-22); detecting immediately following an external stimulus and corresponding behavioral response, brain loci that manifest increase activation (in the form of a topological map) (column 3, lines 40-45; column 10, lines 49-56; column 14, lines 14-24; column 18, lines 12-64); and identifying the brain loci eliminates a behavioral response to an external stimulus (column 18, lines 12-64.)" (point 9, pages 5-6).

5.4 Applicant's Response:

Below, each claim element is shown not to be anticipated by Trivedi. The cited references do not support the Examiner's conclusions. Each claim element is considered below in turn.

5.5 **Claim element 6(1)**. The examiner states: "Trivedi et al. teach a method that includes establishing a correspondence between sensation and stimulus and behavioral response (column 13, lines 15-22); ..." (point 9, page 5, last paragraph).

Applicant's Response:

The cited reference (column 13, lines 15-22) shows that Trivedi et al. use the terms "sensation" and "behavioral response" in a way that is unrelated to their use in the present Specification and in claim 6. Trivedi et al. do not anticipate claim element 6(1) as further demonstrated below.

5.5.1 The term *"Sensation."*

The present Specification addresses the simplest subjective states, while Trivedi et al. address complex ones. The present Specification states: "Red, green, yellow and blue are sensory elements in the submodality of color, in the sensory modality of vision. This reflects a three-level organization, where each basic color is the first level; the submodality is the second level; and the sensory modality is the third level of unimodal organization. The focus of this presentation is on sensory elements and submodalities, rather than on sensory modalities and perception" [§D3-4, page 16, lines 19-25 and page 17, lines 1-16]. In contrast, the Trivedi et al. reference cited by the Examiner (column 13, lines 15-22) states: "A standard neuropsychological test battery typically includes measures of intellectual functions (for example, verbal, spatial and abstract reasoning), memory (semantic and figural), learning, language (expressive and receptive), perception (auditory, visual, and tactile), motor skills, attention and concentration."

All the subjective states cited in the above Trivedi et al. reference are complex. For instance, Trivedi et al. address sensation on the level of *sensory modalities* (such as vision). In contrast, the present Specification relates to submodality elements of sensation (such red, green, yellow and blue). Thus, the subject matter of the present Specification and that of Trivedi et al. is separated by two levels of organization

In conclusion, Trivedi et al. do not address the subjective states that are the subject of the instant Specification.

5.5.2 The term *"behavioral response."*

Claim 6 and the present Specification employs the term "behavioral response" as it is used in psychophysics, which includes voluntary behavioral response and typically does not involve reference to the brain. This point is made clear in the

in subsection §F1 of the Specification [page 20, lines 8-14]: "*Psychophysics* provides methods to correlate the externally observable behavioral response with simple subjective sensations. *Neuroscience* provides methods to correlate the behavioral response with transient activation of some brain loci." In contrast, Trivedi et al. use non-invasive imaging technologies to detect brain responses to stimuli rather than behavioral responses that may be voluntary. Fore example, in the "Brief Summary of the Invention" (column 2, lines 34-60), Trivedi et al. give several examples involving the term "behavior responses" -- all referring to the brain's responses to stimuli and none to voluntary behavioral responses. Thus, there is no overlap between the use of the term "behavioral response" in the present Specification and the use of that term in Trivedi et al.

5.5.3 Conclusions:

1) The terms "sensation" and "behavioral response" are used in Trivedi et al. in grossly different ways than in the instant Specification and claim 6.

2) Trivedi et al. do not address the subject of psychophysical correlations, let alone teach steps involving it. The conclusion that "Trivedi et al. teach a method that includes establishing a correspondence between sensation and stimulus and behavioral response." is incorrect.

3) Trivedi et al. do not anticipate claim element 6(1).

5.6 **Claim element 6(2)**

The Examiner states the following as a basis for the conclusion that Trivedi anticipates claim element 6(2): "detecting immediately following an external stimulus and behavioral response, brain loci that manifest increase activation (in the form of a topological map)" (column 3, lines 40-45; column 10, lines 49-56; column 14, lines 18, lines 12-64)" (point 9 pages 5-6).

Applicant's Response:

The above quoted sentence is a hybrid. The phrase "(in the form of a topological map" is taken from Trivedi. Except for that phrase, the sentence reflects the language of claim element 6(2). That sentence may be read as relating to Trivedi et al. But such reading is not supported by the cited

references to the Trivedi et al patent (column 3, lines 40-45; column 10, lines 49-56; column 14, lines 18, lines 12-64).

5.7 In response to prior Office Action, Applicant remarked that the term "brain loci" is not equivalent to the term "brain region" giving as an example that brain loci are represented by neural clusters such as cortical columns. The Examiner, in Response to Arguments states: "Finally, the applicant states that Trivedi et al. is confined to gross structures and that the instant claim is applicable to neural clusters" and rejects that argument on the grounds that the specifications do not read into claims (point 9, page 10, last paragraph).

Applicant's Response:
In neuroscience, as in ordinary language, the term "region" signifies a spatial expanse, while the term "locus" is more like a point within an area or a region. By equating the term "brain loci" of the instant claim with the term "brain region" used in the Trivedi et al. patent, the Examiner has gone beyond the ordinary usage of these terms.

In conclusion, Trivedi et al. do not anticipate claim element 6(2).

6. **Claim element 6(3)**
The Examiner states the following as indicating that Trivedi et al. anticipate the selective deactivation method of claim element 6(3): "and identifying the brain loci eliminates a behavioral response to an external stimulus (columns 18, lines 12-64)" (point 9, page 5).

6.1 Applicant's Response:
6.1.1 The subject of claim element 6(3) is selective deactivation
6.1.2 The above quoted sentence is unrelated to selective deactivation
6.1.3 The references cited by the Examiner are unrelated to selective deactivation.

In conclusion, Trivedi et al. do not anticipate the third claim element

7. In response to prior Office action, Applicant remarked that two elements of the Specification -- submodality elements of sensation and innateness -- are absent in Trivedi el al. With regards to both cases, the Examiner, in Responses to Arguments, refers to page 9 of the original Specification as a basis for ascribing these attributes to Trivedi el al.

7.1 In regards to submodality elements, the Examiner states: "The applicant first states that Trivedi et al. do not mention submodality elements or elementary mental states. A reference does not have to use the precise language of the claim in order to anticipate the claim. If the reference teaches a limitation that is within the scope of the claim, even if that limitation uses different words, that reference anticipates the claim. In this case, submodality elements of sensations or elementary mental states include vision, according to the instant specification on page 9. Trivedi et al. disclose submodality elements of sensations according to the characterization provided in the instant specification" (point 10, page 6, second paragraph).

Applicant's Response:

7.1.1 The above attribution to the instant specification is mistaken [§D3-4, page 9, lines 5-27 in the original Specification; page 16; lines 19-25 and page 17, lines 1-16 in the Substitute Specification] describes the three-level organization of sensations, stating that the focus of the invention is on the lowest level of organization, exemplified by submodality elements of sensation, which do not contain any smaller constituents. That three-level organization of sensations and the focus on the simplest elements is again addressed in Section L5.1 [page 32, lines 7-22]: "The three levels of organization of sensory elements form a natural basis for a three-part number system. The prefix Q identifies a number as representing an elementary mental state. The high order part represents the sensory modality. Thus vision, hearing, touch, taste, and smell would be represented by Q1, Q2, Q3, Q4, and Q5, respectively. The second part of the number designates a submodality within a given sensory modality. The low order position represents the sensory element within a given submodality. Here is an example for numbering the basic colors and tastes.

Modality	Submodality	Submodality elements					
Vision	Basic color	White	Black	Red	Green	Blue	Yellow
Q1	Q1.8	Q1.8.1	Q1.8.2	Q1.8.3	Q1.8.4	Q1.8.5	Q1.8.6
Taste	Basic taste	Sweet	Salty	Sour	Bitter	Umami	
Q4	Q4.1	Q4.1.1	Q4.1.2	Q4.1.3	Q4.1.4	Q4.1.5"	

7.1.2 The above quotation and table from page 32 in the substitute Specification make explicit reference to "vision" as a sensory modality and that it is thus separated by two levels of organization from the instant invention – subjective states which do not contain smaller constituents, such as submodality elements of sensations.

7.1.3 In contrast, the cited reference in Trivedi et al. gives the following examples of the subject matter of that patent (column 13, lines 15-22): "A standard neuropsychological test battery typically includes measures of intellectual functions (for example, verbal, spatial and abstract reasoning), memory (semantic and figural), learning, language (expressive and receptive), perception (auditory, visual, and tactile), motor skills, attention and concentration." In conclusion, Trivedi et al. do not anticipate the instant Specification and claim in regards to elementary mental states or submodality elements of sensation.

7.2 In regards to innateness, the Examiner, in Response to Arguments, states: "The applicant then states that the notion of innateness is central to the present invention, and that Trivedi et al. do not address innateness. Again, a reference does not have to use the precise language of the claim in order to anticipate the claim. In this case, innateness may be a visual perception according to the specification in page 9. Since Trivedi et al. disclose simulations that include visual perception (column 13, lines 15-22) Trivedi et al. also include innateness in their method. In addition, the recitation "innate" has not been given patentable weight because the recitation occurs in the preamble. A preamble is not generally accorded any patentable weight because where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process or structural limitations are able to stand alone. (See *in re Hirao*, 535

F.2d 67, 190 USPQ 15 (CCPA 1967) and *Kropa v. Roble*, 187, F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951)" (point 10, page 7, top paragraph).

Applicant's Response:

7.2.1 The notion of innateness is introduced in the Specification explicitly and prominently, apart from being mentioned in the preamble. Section §C2.1 of the Specification [page 14, lines 13-18] introduces the notion of innateness as the first of three basic notions on which the invention is based: "The information received from sensory receptors is devoid of sensory qualities. Sensory qualities are innate, evoked in the brain, and are thus mental. Sweetness, for example, is not a property of sugar, nor does taste originate in taste receptors. Instead, that sensation is innate, and is evoked in the brain. The same applies to the middle C pitch, the color red, or to the sensation of pain." The Examiner, seeing the reference in the Preamble but overlooking it in the Specifications erred in concluding that it is not explicitly addressed in the Specifications.

7.2.2 The Examiner then states reasons why the notion of innateness *may* be attributed to Trivedi. Innateness *may not* be attributed to Trivedi et al for the following reasons:

1. The instant Specification is clear that submodality elements of sensations are innate while the more complex perception – is not. Thus, for example, the sensation of red or yellow is innate while the sensation of their combination as orange (involving interaction of red and orange rather than red and blue), is not. The Examiner cites page 9 in original Specification that visual perception is innate. Inspection of that page [§D3-4, page 16, lines 19-25 and page 17, lines 1-16 in the substitute Specification] proves the opposite.

2. Trivedi et al. make *neither explicit nor implicit* reference to innateness.

3. Perception involves input from sensory receptors: hence, *it cannot be innate.*

Thus, the innateness of subjective states that do not contain smaller constituents, which is a central tenet of the instant Specification and claim 6, is not anticipated by Trivedi et al.

7.3 Applicant respectfully submits that the above remarks show the Specification to meet the description and enablement requirement and that Trivedi et al do not anticipate any of the three elements of claim 6, and respectfully requests that the rejection of claim 6 be withdrawn.

III CONCLUSION

1. The instant invention presents the difficulty of coming to terms with the jarring fact that sensations are evoked in the brain rather than received from the senses. Apart from that difficulty, the Specification is simple, general and precise. A person with ordinary skill in the art would have no difficulty applying the Specification to the identification and validation of brain loci correlates of submodality elements of sensation within conceptually pre-identified brain areas.

2. Appellant believes that the arguments presented show that the Specification meets the description and enablement requirements and that Claim 6 is not anticipated by Trivedi et al.

3. Appellant believes that it would be premature, wrong and not in the public interest that the Examiner's determination be allowed to be final.

Accordingly it is respectfully submitted that the rejection of Claim 6 should be reversed.

Respectfully submitted,

Daniel Alroy

APPENDIX I - APPEALED CLAIM

(Previously presented) Claim 6 recites:

A method for identifying brain loci of neural correlates of a particular elementary mental state, such as any innate submodality element of sensation, comprising the steps of:

(1) establishing correspondence between said submodality element of sensation and the external stimulus that normally elicits it, and then with a voluntary behavioral response, thus establish correspondence between said stimulus and said response, so that said behavioral response following said stimulus signifies the presence of the said element of sensation, and the absence of said behavioral response signifies the absence of said element of sensation;

(2) detecting, immediately following said external stimulus and said corresponding behavioral response, brain loci that manifest transient increased activation;

(3) identifying, among the said brain loci that manifested increased activation, activation in response to said stimulus, those whose inactivation selectively eliminates said behavioral response to said external stimulus, without eliminating behavioral responses to external stimuli that induce other elements of sensation within the same submodality.

APPENDIX II - EVIDENCE

1. Applicant's letter dated May 31, 2001 to the then Assistant Commissioner

2. Response dated July 12, 2001

3. A cross-reference of page and line numbers between the original patent application, the substitute specification and the published patent application

EXHIBIT 1

Mr. Nicholas P. Godici
Acting Commissioner of Patents
Patent and trademark Office
Washington, D. C. 20231.

Dear Mr. Godici:

I respectfully request that a new class be established for inventions relating to the neural correlates of subjective states.

I respectfully suggest that such a class cover neural correlates for all such states, including the classical five senses (vision, hearing, touch taste and smell) as well as hunger (as distinct from regulation of food intake), and the sensations of pain.

Respectfully,

D. A.

May 31, 2001

Daniel Alroy * 19 Stanton Street, NY, NY 10002 * 212 505-0110

EXHIBIT 2

UNITED STATES PATENT AND TRADEMARK OFFICE

COMMISSIONER FOR PATENTS
UNITED STATES PATENT AND TRADEMARK OFFICE
WASHINGTON, D.C. 20231
www.uspto.gov

July 12, 2001

Daniel Alroy
19 Stanton Street
New York, NY 10002

Dear Mr. Alroy:

Thank you for your suggestions for improving the United States Patent Classification (USPC) system. As you probably know, the USPC is continuously revised to keep up with the changing landscape of technology. Patents are normally classified into existing classifications according to the inherent functions of devices or processes, rather than according to their specific applications. This practice has been found to facilitate patentability searches performed by Patent Examiners. If the inherent functions for new technological devices or processes are not specifically provided for in the USPC, or if the patent documents for a new technology are being scattered into existing classifications based upon secondary features, then a reclassification project may be performed to create new classifications or modify existing ones based upon the new technological concepts.

Not having the benefit of specific examples to go by, it appears that the subject matter you describe would best fit into the classes dealing with artificial intelligence or prosthetic devices. This art primarily is located in class 706 (Data Processing: Artificial Intelligence) and class 623 (Prosthesis i.e., Artificial Body Members, Parts Thereof, Or Aids And Accessories Therefor). Subcombinations of these systems, for example, pressure sensors (touch) are classified in class 73 (Measuring And Testing), whereas electrochemical sensors (taste, smell) are classified in class 324 (Electricity: Measuring And Testing), or class 436 (Analytical And Immunological Testing). Visual spectrum optical sensors (sight) are classified in class 356 (Optics: Measuring And Testing). Sound sensors (hearing) are classified in class 381 (Electrical Audio Signal Processing Systems And Devices). Class 381 also provides for an artificial larynx in subclass 70.

Every year the Office of Patent Classification works with the Technology Centers to identify potential reclassification projects from those subclasses in the USPC having the most search and filing activity combined with the highest density of classified documents. Not all of the subclasses identified for potential reclassification may be reclassified in a given year. The subclasses relating to neural correlates are not currently among the list of planned or ongoing reclassification projects for the coming year. However, the USPTO is grateful for your suggestions on new classifications in the USPC, and they are being referred to the Supervisory Patent Classifier who coordinates reclassification planning in these technologies, for consideration in future planning.

Thank you again for your suggestion and your interest in the U.S. Patent system. If you have further questions concerning the U.S. Patent Classification system, please feel free to contact Harold Smith, Director of the Office of Patent Classification, at 703-305-5107.

Sincerely,

Bruce Kisliuk
Executive Assistant
Office of the Commissioner for Patents
(703) 305-8800

EXHIBIT 3

Cross reference of page and line-numbers

Section and Subsection	Original RPA	Substitute Specification	Published RPA
C2.1	7: 1 - 5	14: 13-18	0037-0038
C2.2	7: 6-10	14: 19-23	0039-0040
C4	7: 20-25	15: 7-12	0045-0046
D1.1-1.2	8: 7-14	15: 19-26	0052-0054
D2	8: 19-27 & 9:1-4	16: 5-18	0057-0058
D3-4	9: 5-27	16: 19-25 & 17: 1-16	0059-0062
D5.1-5.2	10: 1- 2-24	17: 17-29 & 18: 1-26	0064-0066
E	11: 9-27 & 12:1-14	19: 1-29 & 20: 1 - 6	0072-0080
E3	12: 1-10	19: 21-29 & 20: 1 - 2	0077-0078
F1	12: 23-25	20: 8-14	0081-0088
F2.1	13: 2 - 8	20: 20-26 & 21: 1 - 2	0090-0091
F2.2	13: 9- 21	21: 3-15	0092-0093
F3.1	13: 22-30	21: 16-25	0095-0096
F3.2	14: 1 - 5	21: 26-28 & 22: 1 - 2	0097-0098
F4.1	14: 13-20	22: 10-18	0101-0102
F4.2	14: 21-28 & 15: 1-3	22: 19-27 & 23: 1 - 2	0103-0104
F6	14:16-25	23: 15-25	0109-0110
L5.1	24: 7-22	32: 7-22	0187-0188
M1	25: 8-11	33: 9-11	0197-0198
O1.2	26: 14-16	34: 9-11	0210-0215
O1.3	26: 17-21	34: 12-17	0214-0215
O2	27:13-19	35: 11-17	0228-0232
O4	27: 20-24	35: 18-22	0233-0234
P1.1	29: 1- 8	36: 26-27 & 37: 1-6	0248-0249
P3	30: 3-13	38: 1-24	0256-0257
P4	30:14-26	38: 12-24	0258-0262
P5	31: 1-15	38: 25-28 & 39: 1-12	0263-0269
R2.1	34: 3-20	42: 1-18	0292-0293
S4	37: 3-7	45: 8-12	0312

APPENDIX III - RELATED PROCEEDINGS

Applicant respectfully submits that there are no proceedings related to this appeal in which any decisions were rendered.

APPENDIX IV - TABLE OF CASES

No case law is relied upon in this Brief.

APPENDIX V - LIST OF REFERENCE

U.S. Patent No.	Issued Date	102(e) Date	Inventors
4,862,359	Aug. 29, 1989		Trivedi, et al.